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CHI MEI OPTOELECTRONICS CORP.

Issue Date: July.02'2001
Model: M170E1 -02
Approval

TFT-LCD Approval Specification

Model No.: M170E1 -02

Customer : Acer Communications & Multimedia Inc.

Approved by :

Note :

Liquid Crystal Division		
QRA Dept.	RD Dept.	PD Dept.
Approval	Approval	Approval
90.7.6 宗嗣	90.7.6 忠光	90.7.5 慕仁

Version 3.3

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REVISION HISTORY

Version	Date	Description
Ver3.0	May.31,'01	Issue Approval Specification
Ver3.1	Jun.14 ,'01	Page 5 Update Depth of Module Size: 21(Max.)→15(Max.)/ Add Note(1) Page 7 Update VSA of 2.1 TFT LCD MODULE POWER CONSUMPTION: Typ: 13→10 Page 9 Update 3.1 TFT LCD MODULE. Page 10~14 Update Interface Signal CXA1: Pin10, 11, 12, 42, 43, 44 Update Interface Signal CXA2: Pin 30, 32, 35 Update Interface Signal CXB1: Pin 10, 11 ,12, 42, 44, 45 Update Interface Signal CXB2: Pin 2, 3, 4, 30, 32, 35 Update Interface Signal CNY1: Pin 1, 2, 9, 13, 18, 19, 20 Page 15 Delete Start Pulse Signal Delay Time & Driver Output Delay Time1 & Time2 Page 16, 19 Update Timing Chart Page 18 Delete Output Delay Time(1) Page 21 Update White Variation of 5.2 OPTICAL SPECIFICATIONS: 1.25(Typ.)/1.4(Max.)→20(Typ.)/30(Max.)/ %(Unit) Page 24 Add Note(8).
Ver3.2	Jun.19,'01	Page 5 Update depth of module size: -(Typ.)/15(Max.)→13(Typ.)/14(Max.) Page 20 Add Power Sequence Spec. Page 22 Update Viewing Angle:θ_X+:50(Min.)/60(Typ.)→70(Min.)/80(Typ.) θ_X-:50(Min.)/60(Typ.)→70(Min.)/80(Typ.) θ_Y+:30(Min.)/40(Typ.)→ 50(Min.)/60(Typ.) θ_Y-: 50(Min.)/60(Typ.)→ 70(Min.)/80(Typ.) Conditions: CR≧10 →CR=5 Page 25 Update Note(8).
Ver3.3	July.02'01	Page 20 Update Power Sequence Spec. Page 25 Update Note(8).

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GENERAL DESCRIPTION

OVERVIEW

This product is a 17.0" TFT Liquid Crystal Display Module with 2 dual CCFLs Backlight unit and 30 pins LVDS interface. This module supports 1280 x 1024 SXGA resolution and can display 16 million colors. The inverter module for Backlight is not built in.

FEATURES

-SXGA (1280x1024 pixels) resolution

-2 dual CCFLs (Cold Cathode Fluorescent Lamp)

-DE only mode

APPLICATION

-TFT-LCD Monitor

GENERAL SPECIFICATI0NS

Item	Spec.	Unit
Screen Size	17.0 Diagonal	inch
Bezel Opening Area	342.0(H) x 274.4(V)	mm
Effective Display Area	337.92(H) x 270.34(V)	mm
Driver Element	a-si TFT active matrix	-
Pixel Number	1280 x R.G.B. x 1024	pixel
Pixel Pitch	0.264(H) x 0.264(W)	mm
Pixel Arrangement	RGB vertical stripe	-
Display Colors	16M	color
Transmissive NC	Normally White	-
Surface Treatment	Haze 25%,Hard-Coating,Anti-static	-

MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	403.5	404	404.5	mm	
	Vertical(V)	321.7	322.2	322.7	mm	
	Depth(D)	-	13	14	mm	(1)
Weight		-	2,000	2,150	g	

Note (1) The Depth is without boss.

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1. ABSOLUTE MAXIMUM RATINGS

1.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Values		Unit	Note
		Min.	Max.		
Storage temperature	Tst	-20	+60	ºC	(1)
Operating temperature (Ambient Temperature)	Top	0	+50	ºC	(1),(2)
Shock(non-operating)	Snop	-	30	G	(3),(5)
Vibration(non-operating)	Vnop	-	1.5	G	(4),(5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

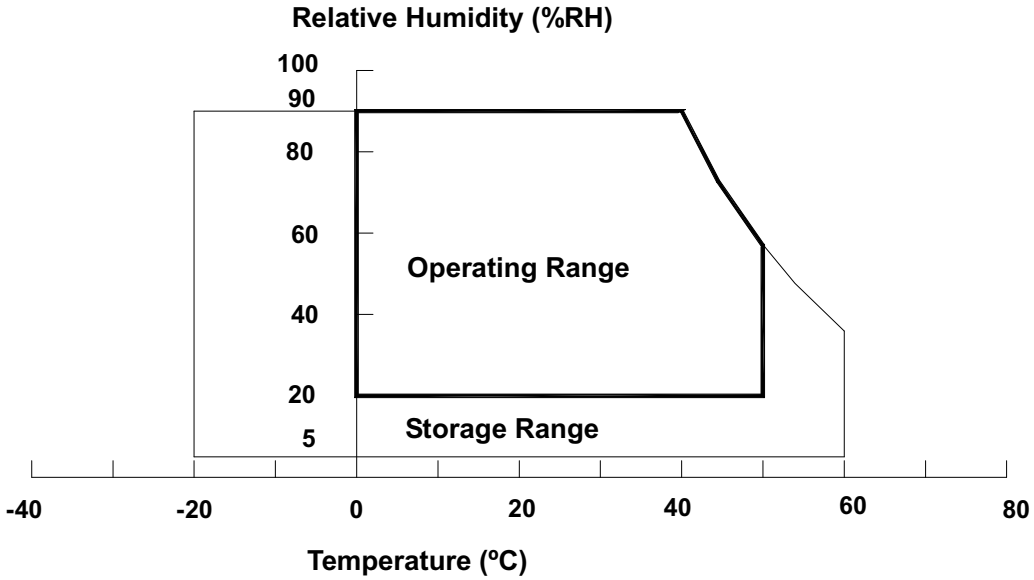
(c) No condensation.

Note (2) The temperature of panel surface should be 0 ºC Min. and 60 ºC Max.

Note (3) 6 ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 500 Hz, 0.5 Hr each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



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1.2 ELECTRICAL ABSOLUTE RATINGS

(1)TFT LCD MODULE

Item	Symbol	Values		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	6.0	V	Ta = 25 ± 2 ºC
Input Signal Voltage	V_{IN}	-0.3	4.3	V	

(2)BACKLIGHT UNIT

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Current	I_L	6.0	13.0	14.0	m A_{RMS}	(1),(2)
Lamp Frequency	F_L	30	45	80	KHz	(1)

Note (1) Permanent damage to device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for a dual lamp (Refer to the Note (1) of 2.2 BACKLIGHT UNIT for further information).

2. ELECTRICAL SPECIFICATIONS

2.1 TFT LCD MODULE POWER CONSUMPTION

Synbol	Value			Unit
	Min	Typ	Max	
ISA	73.5	-	203	mA
ISD	9.72	-	19.9	mA
IGD	0.729	-	0.731	mA
IGH	3.62	-	3.72	mA
IGL	2.26	-	2.71	mA
IREF	3.07	-	3.07	mA
VSA	-	10	-	V
VSD	-	3.3	-	V
VGD	-	3.3	-	V
VGH	-	23	-	V
VGL	-	-7	-	V
VREF	-	9.6	-	V

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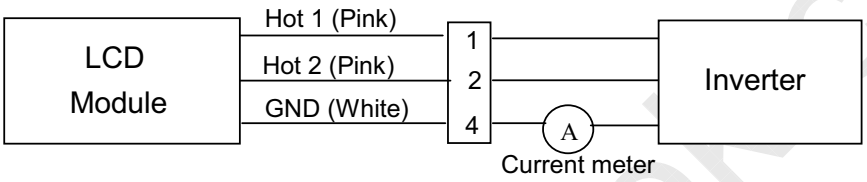
2.2 BACKLIGHT UNIT

BACKLIGHT (2 Dual CCFLs)						
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	640	720	800	V_{RMS}	(1)
Lamp Current	I_L	6.0	13.0	14.0	mA_{RMS}	(1)
Lamp Turn On Voltage	V_S	-	-	1150	V_{RMS}	25°C
		-	-	1500	V_{RMS}	0 °C
Operating Frequency	F_L	30	45	80	KHz	(1)
Lamp Life Time	L_{BL}	50,000	-	-	Hrs	13mA
Power Consumption	P_L	-	9360	-	MW	(4)

Note (1) Lamp current is measured by utilizing a current meter for high frequency as shown below:



Note (2) The voltage shown above should be applied to the lamp for more than 1 second after startup. Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) $P_L = I_L \times V_L$.

Note (5) The lifetime (Hr) of a lamp can be defined as the time in which it continues to operate under the condition Ta = 25±2℃ and I_L = 14.0 mArms until one of the following event occurs:

(a) When the brightness becomes 50% or lower than its original,

(b) When the effective ignition length becomes 80% or lowers than its original value. (Effective ignition length is defined as an area that has less than 70% brightness compared to the brightness in the center point.)

Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be designed with care so as not to produce too much current leakage from high-voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the backlight and the inverter (miss-lighting, flicker, etc.) never occurs. When the above situation is confirmed, the module should be operated in the same manners as it is installed in your instrument.

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The connector information of Blacklight unit.

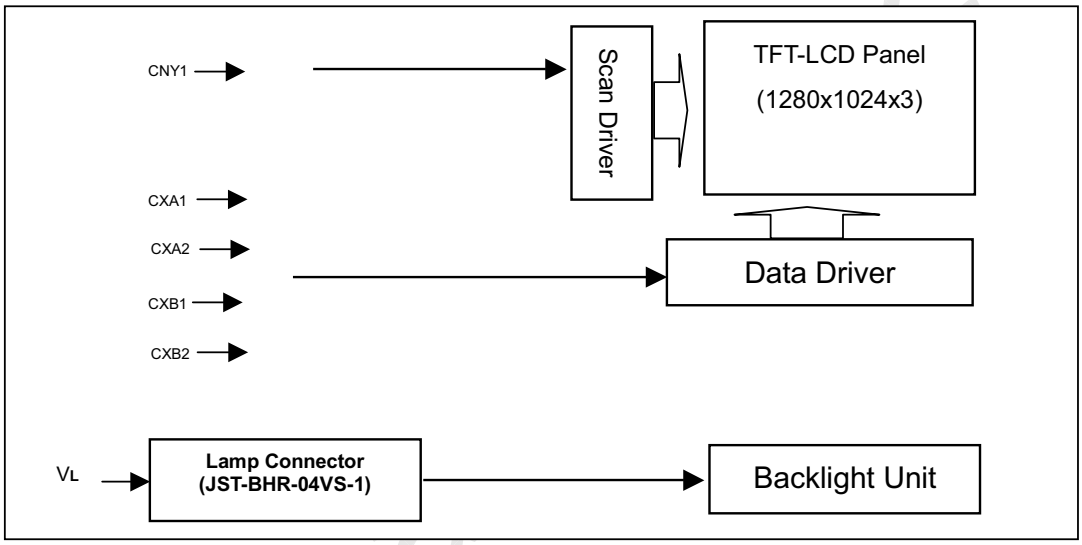
Pin	Symbol	Description	Remark
1	HV1	High Voltage	Pink
2	HV2	High Voltage	Pink
3	NC	No Connection	-
4	LV	Ground	White

Note (1) Connector Part No.: BHR-04VS-1 (JST)

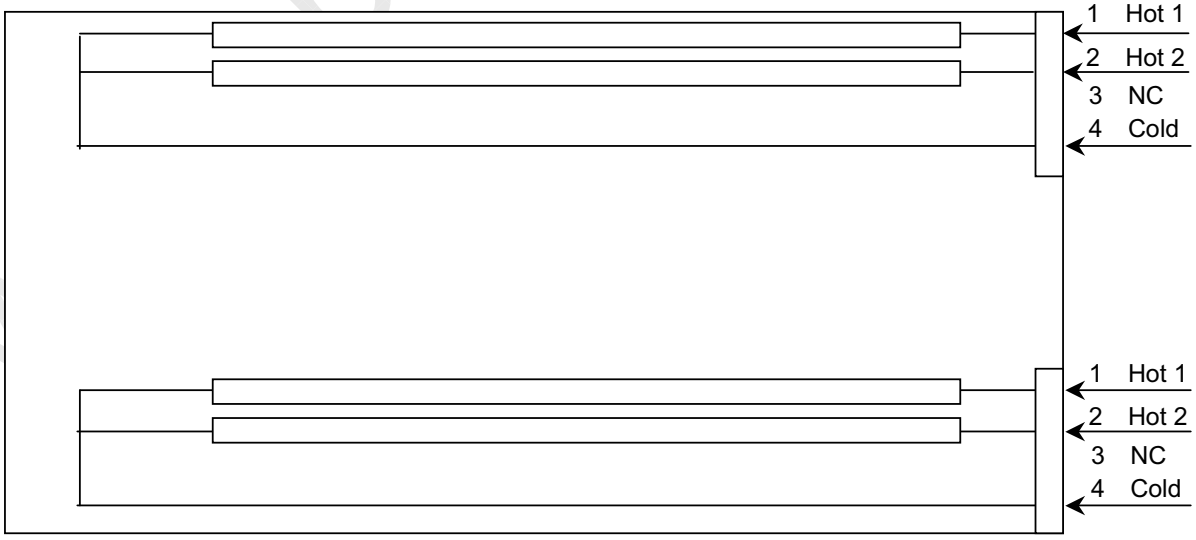
Note (2) User's connector Part No.: SM04 (4.0) B-BHS-1-TB (JST)

3. BLOCK DIAGRAM

3.1 TFT LCD MODULE



3.2 BACKLIGHT UNIT



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4. INTERFACE SPECIFICATIONS

4.1 Signal Descriptions

Interface Signal CXA1				Interface Signal CXA2			
Pin	Symbol	I/O	Function	Pin	Symbol	I/O	Function
1	VSA	I	For supply analog power to the Device.	1	RPS2		TFT test pin
2	VSA	I		2	VCM	I	Panel common voltage
3	VSA	I		3	VCM	I	
4	VSA	I		4	GND	-	Ground
5	VSA	I		5	D00	I	For Data input Input gray scale data (8 bit) multiple 2 pixels (6 dot) 48 bit length image data Dn0: LSB, Dn7: MSB
6	GND	-	Ground	6	D01	I	
7	GND	-	Ground	7	D02	I	
8	GND	-	Ground	8	D03	I	
9	GND	-	Ground	9	D04	I	
10	-	-	NC	10	D05	I	
11	-	-	NC	11	D06	I	
12	-	-	NC	12	D07	I	
13	LR	I	For Shift Direction Select Right shift (Out1-Out384): H Left shift (Out384-Out1): L	13	D10	I	
14	VSD		For supply digital power the Device.	14	D11	I	
15	LP	I	Select the charge /discharge current level LP="H" : Low current level LP="L" : Normal current level	15	D12	I	
16	RS	I	Switch LCD drive capability RS="H" : For the heavy load RS="L" : For the specification load	16	D13	I	
17	SHC	I	Control the output circuit	17	D14	I	
18	D30	I	For Data input Input gray scale data (8 bit) multiple 2 pixels (6 dot) 48 bit length image data Dn0: LSB, Dn7: MSB	18	D15	I	
19	D31	I		19	D16	I	
20	D32	I		20	D17	I	
21	D33	I		21	D20	I	
22	D34	I		22	D21	I	
23	D35	I		23	D22	I	
24	D36	I		24	D23	I	
25	D37	I		25	D24	I	
26	D40	I		26	D25	I	
27	D41	I		27	D26	I	
28	D42	I		28	D27	I	
29	D43	I		29	RV1	I	Select the input data invert or not
30	D44	I		30	RV2	I	RV1: For port 1 inverting control RV2: For port 2 inverting control RV1,2="H": Data are inverted RV1,2="L": Data are not inverted

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31	D45	I		31	POL	I	POL="L" : The reference voltages for Odd number outputs are GMA1~GMA8 Even number outputs are GMA9~GMA16 POL="H" : The reference voltages for Odd number outputs are GMA9~GMA16 Even number outputs are GMA1~GMA8
32	D46	I		32	-	-	NC
33	D47	I		33	TP1	I	Latch the contents of the data register and transfer to D/A converter at the rising edge and output gray scale voltage at falling edge.
34	D50	I		34	CKH	I	For transfer the Shift Register Data Clock input. Write the data register at the rising edge. CKH should be input continuously.
35	D51	I		35	MODE	-	NC
36	D52	I		36	GND	-	Ground
37	D53	I		37	GM1	I	For supply γ Correction Power to the Device. Keep the reference voltage during output gray scale voltage.
38	D54	I		38	GM2	I	
39	D55	I		39	GM3	I	
40	D56	I		40	GM4	I	
41	D57	I		41	GM5	I	
42	VCM	I	Panel common voltage	42	GM6	I	
43	VCM	I		43	GM7	I	
44	STH	I	For Start Pulse I/O of internal Shift Register	44	GM8	I	
45	RPS1		TFT test pin	45	GND	-	Ground

Interface Signal CXB1				Interface Signal CXB2			
Pin	Symbol	I/O	Function	Pin	Symbol	I/O	Function
1	VSA	I	For supply analog power to the Device.	1	RPS4		TFT test pin
2	GM9	I	For supply γ Correction Power to the Device. Keep the reference voltage during output gray scale voltage.	2	VCM	I	Panel common voltage
3	GM10	I		3	VCM	I	
4	GM11	I		4	-	-	NC
5	GM12	I		5	D00	I	For Data input Input gray scale data (8 bit) multiple 2 pixels (6 dot) 48 bit length image data Dn0: LSB, Dn7: MSB
6	GM13	I		6	D01	I	
7	GM14	I		7	D02	I	
8	GM15	I		8	D03	I	
9	GM16	I		9	D04	I	
10	-	-	NC	10	D05	I	
11	-	-	NC	11	D06	I	
12	-	-	NC	12	D07	I	

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13	L/R	I	For Shift Direction Select Right shift (Out1-Out384): H Left shift (Out384-Out1): L	13	D10	I	
14	VSD	I	For supply digital power the Device.	14	D11	I	
15	LP	I	Select the charge /discharge current level LP="H" : Low current level LP="L" : Normal current level	15	D12	I	
16	RS	I	Switch LCD drive capability RS="H" : For the heavy load RS="L" : For the specification load	16	D13	I	
17	SHC	I	Control the output circuit	17	D14	I	
18	D30	I	For Data input Input gray scale data (8 bit) multiple 2 pixels (6 dot) 48 bit length image data Dn0: LSB, Dn7: MSB	18	D15	I	
19	D31	I		19	D16	I	
20	D32	I		20	D17	I	
21	D33	I		21	D20	I	
22	D34	I		22	D21	I	
23	D35	I		23	D22	I	
24	D36	I		24	D23	I	
25	D37	I		25	D24	I	
26	D40	I		26	D25	I	
27	D41	I		27	D26	I	
28	D42	I		28	D27	I	
29	D43	I		29	RV1	I	Select the input data invert or not RV1: For port 1 inverting control RV2: For port 2 inverting control RV1,2="H": Data are inverted RV1,2="L": Data are not inverted
30	D44	I		30	RV2	I	
31	D45	I		31	POL	I	POL="L" : The reference voltages for Odd number outputs are GMA1~GMA8 Even number outputs are GMA9~GMA16 POL="H" : The reference voltages for Odd number outputs are GMA9~GMA16 Even number outputs are GMA1~GMA8
32	D46	I		32	-	-	NC
33	D47	I		33	TP1	I	Latch the contents of the data register and transfer to D/A converter at the rising edge and output gray scale voltage at falling edge.
34	D50	I		34	CKH	I	For transfer the Shift Register Data Clock input. Write the data register at the rising edge. CKH should be input continuously.
35	D51	I		35	MODE	-	NC
36	D52	I		36	GND	-	Ground

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37	D53	I		37	VSD	I	For supply digital power the Device.
38	D54	I		38	VSD	I	
39	D55	I		39	VSD	I	
40	D56	I		40	GND	-	Ground
41	D57	I		41	GND	-	Ground
42	STH	I	For Start Pulse I/O of internal Shift Register	42	GND	-	Ground
43	RPS3		TFT test pin	43	GND	-	Ground
44	VCM	I	Panel common voltage	44	GND	-	Ground
45	VCM	I		45	GND	-	Ground

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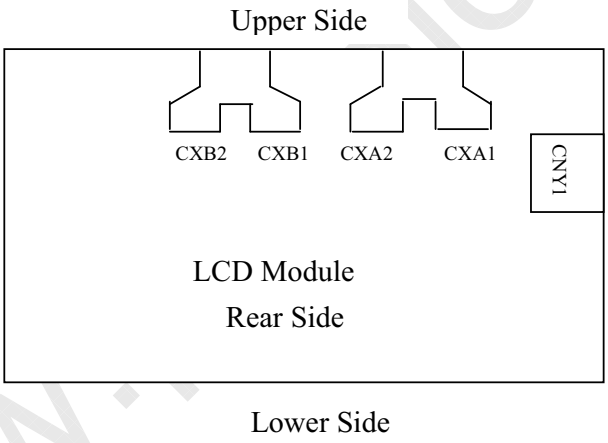
Interface Signal CNY1				Interface Signal CNY1			
Pin	Symbol	I/O	Function	Pin	Symbol	I/O	Function
1	VGH	I-	Power supply for LCD drive	11	CKV	I	Vertical shift clock. This is the shift clock for the shift registers. Data is shifted though the shift registers synchronously with the rising edge of CKV
2	VGH	I		12	GND	-	Ground
3	GND	-	Ground	13	VAA	I	VSA
4	GND	-	Ground	14	RPG4		TFT test pin
5	VGL	I	Analog input pins. These pins accept as their input the OFF level at the LCD panel drive pins.	15	RPG3		TFT test pin
6	VGL	I		16	RPG2		TFT test pin
7	VGD	-	Power supply for the internal logic	17	RPG1		TFT test pin
8	VGD	-		18	VREF	I	Reference voltage
9	STV	I	Vertical shift data control signal	19	VCM	O	Panel common voltage
10	OE	I	Output enable pins. This signals control the data appearing at the LCD panel drive pins. The VGH/L voltage is output when OE are high; normal shift data is output when OE are low.	20	VCM	O	Panel common voltage



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4.2 Input Signal Timing

AC(In case of 3.0V≦VSD＜3.6)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
CKH Pulse Width	t1		14			ns
CKH High Level Width	t2		2			ns
CKH Low Level Width	t3		2			ns
Data/REV Setup Time	t4		2			ns
Data/REV Hold Time	t5		0			ns
Start Pulse Setup Time	t6		2			ns
Start Pulse Hold Time	t7		0			ns
TP1 signal to EI0(input) signal Setup Time	t17		70			ns
CKH of Tail Data to TP1(L) Hold Time	t18		1			CKH count
TP1 signal High Level Width	t20		1.5			μs
POL signal to TPI signal Setup Time	t21		-5			
TP1 signal to POL signal Hold Time	t22		6.0			ns
TP1 signal to SHC signal Hold Time	t25		4.5			μs
SHC signal to TP1 signal Setup Time	t26		4.5			μs

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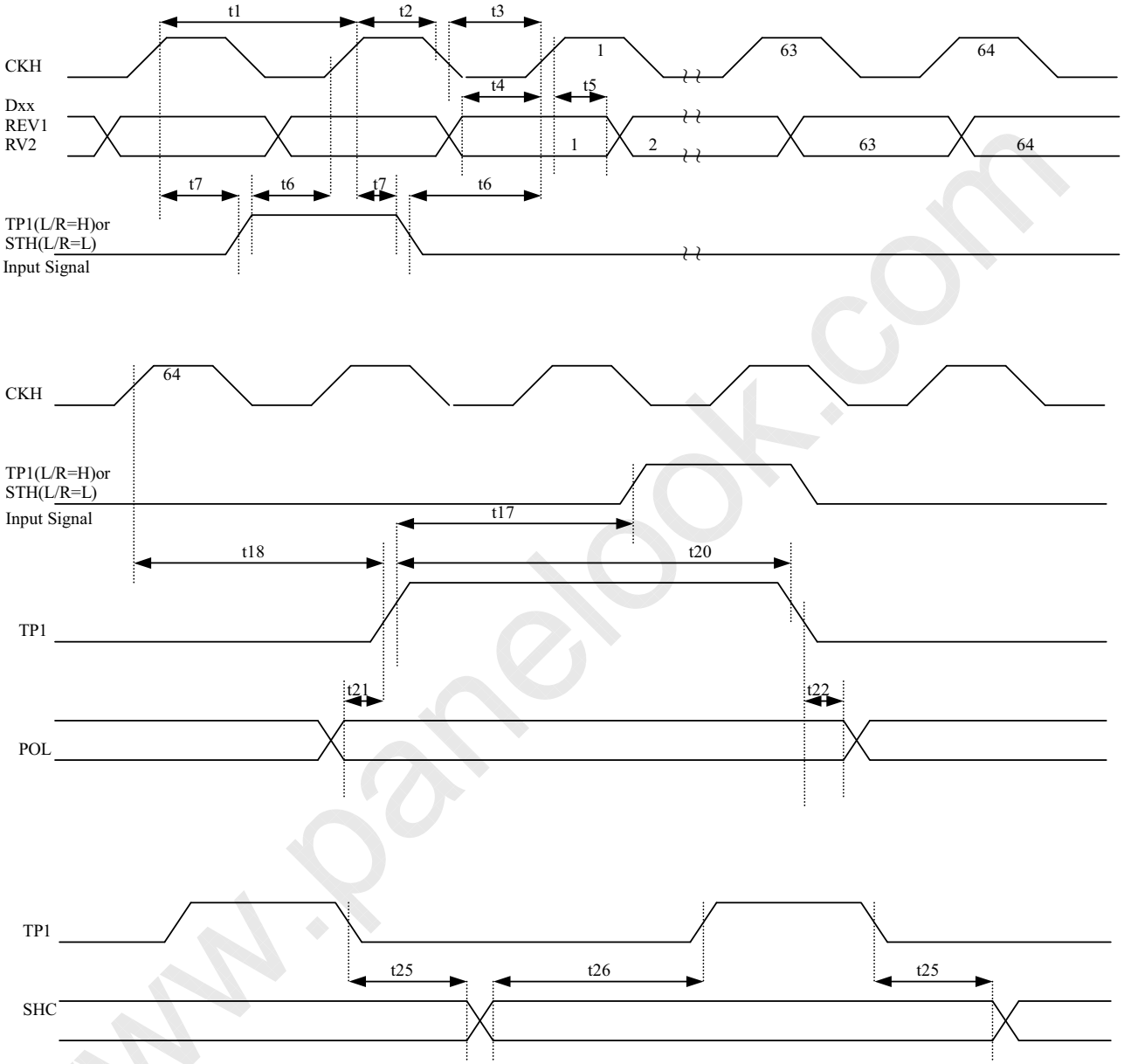
Timing Chart



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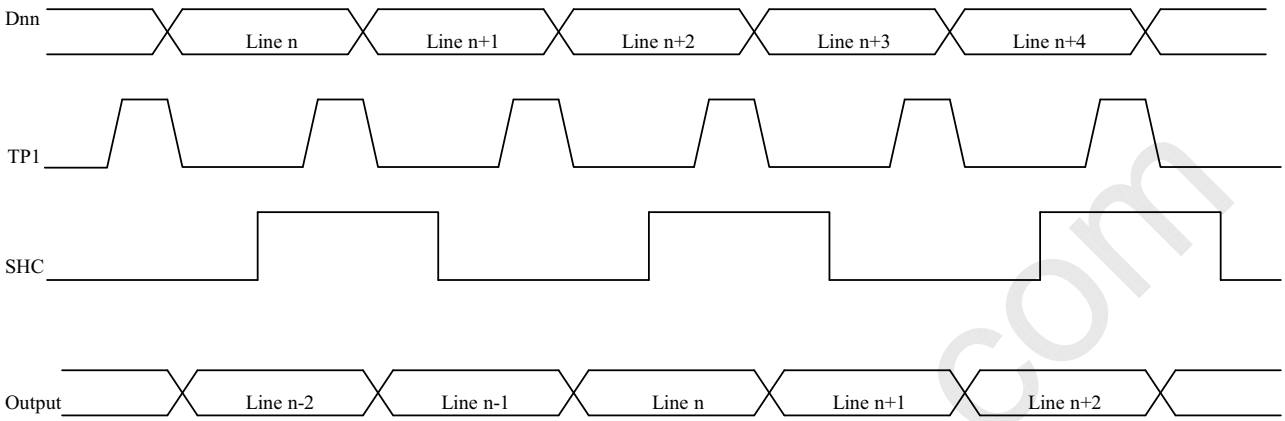
The Relationship between Input Data and Output



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AC Characteristic(Reference to VGH= 25 to 42V, VDD= 3.0 to 16V, Ta= -20 to 75℃ unless otherwise noted)

Parameter	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Clock Period	tCPV	-	-	10	-	-	μs
CKV Pulse Width (H)	tCPVH	-	-	4	-	-	μs
CKV Pulse Width (L)	tCPVL	-	-	4	-	-	μs
Data Set-up Time	tsDI	-	-	1	-	-	μs
Data Hold Time	thDI	-	-	1	-	-	μs
OE Enable Time	tWOE	-	-	1	-	-	μs
Output Delay Time (2)	tpdG	-	CL=300pF	-	-	1	μs
Output Delay Time (3)	tpdOE	-	CL=300pF	-	-	1	μs

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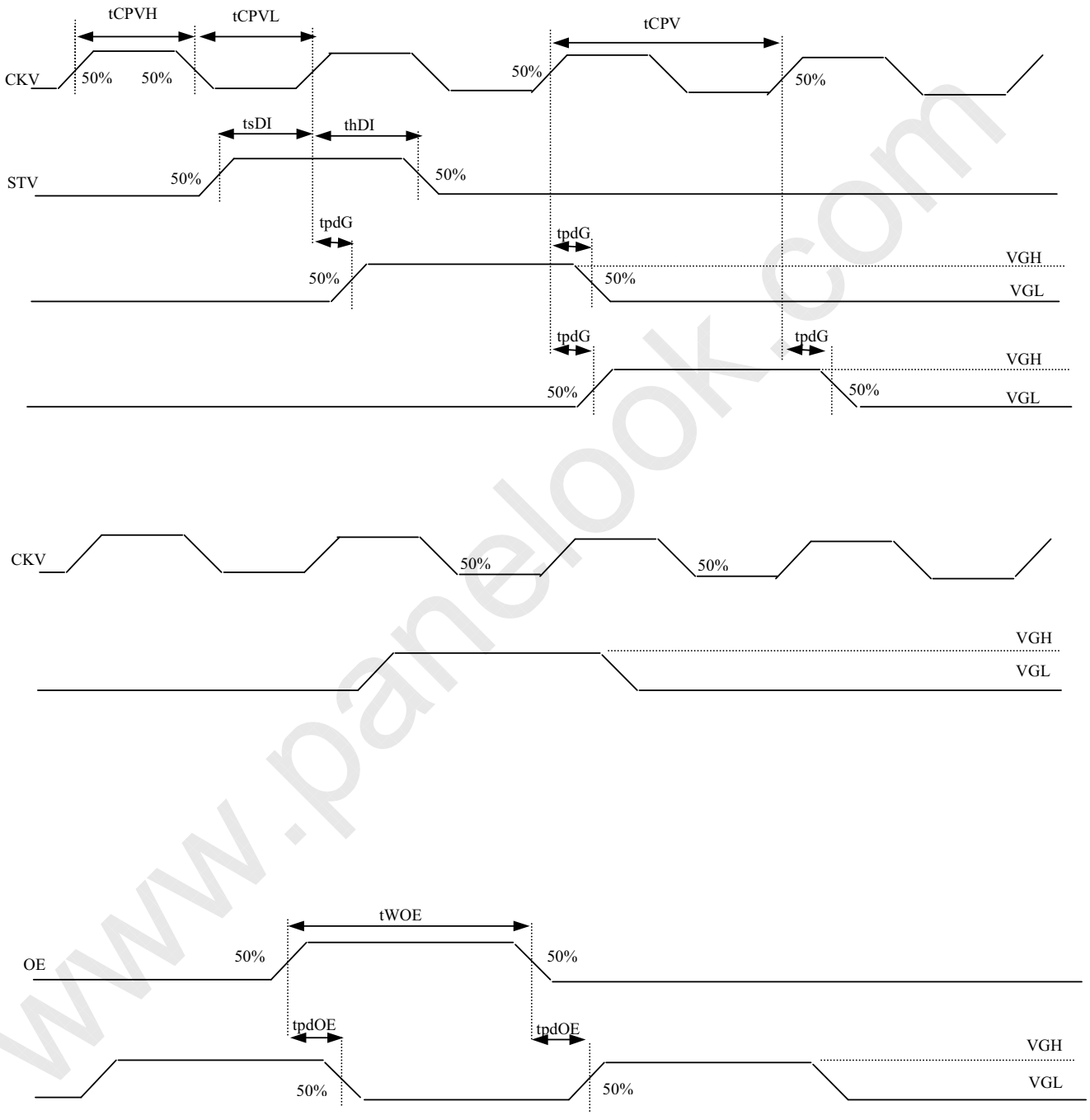
Timing Chart



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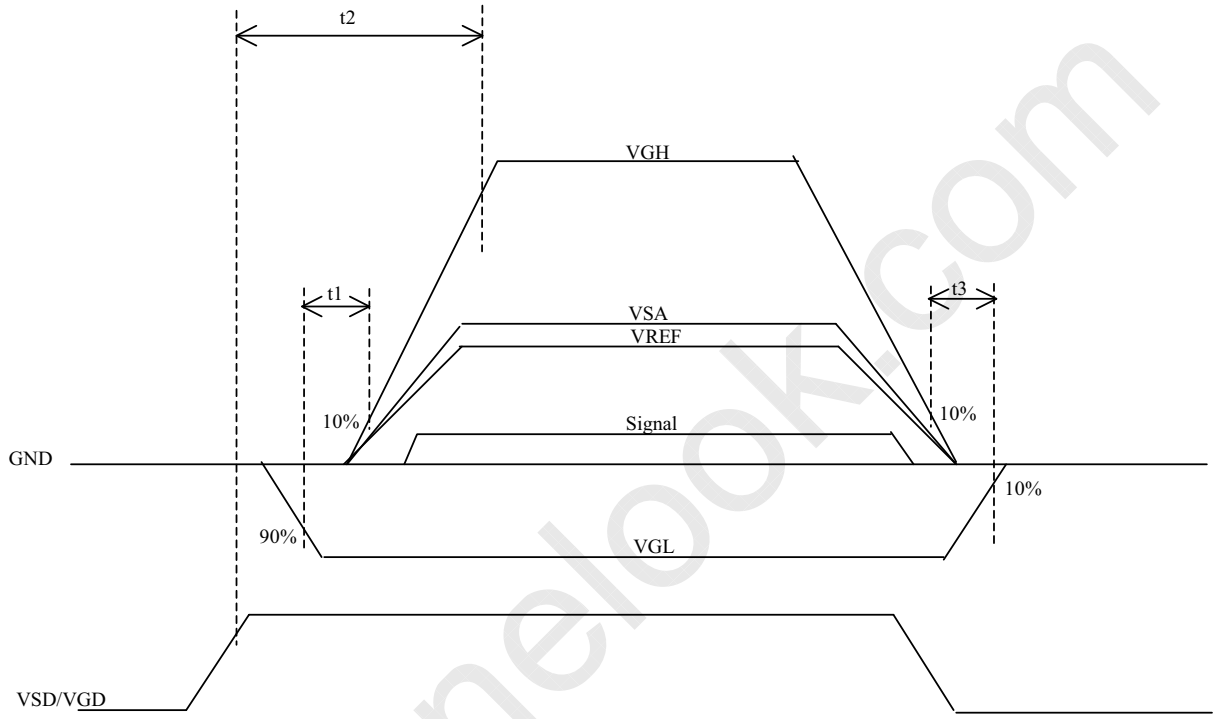
Power Sequence Spec.

Voltage should be met the following



10ms≦t2≦250ms

t1, t3≧1.5ms

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4.3 COLOR DATA INPUT ASSIGNMENT

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	G5	G4	G3	G2	G1	G0	R7	R6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

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5. OPTICAL CHARACTERISTICS

5.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{cc}	5.0	V
Input Signal	According to typical value in "Electrical Characteristics"		
Inverter Current	I_L	13.0	mA
Inverter Driving Frequency	F_L	40	K Hz
Inverter	Sumida H05-4785		

The measuring method is shown in 5.2 OPTICAL SPECIFICATIONS. The following items are measured under stable conditions about 20 minutes after the module works. The optical characteristics should be measured under lamp current I_L = 13.0 m Arms and in a dark environment (≤ 2 lux) or equivalent state with the methods shown in Note (6).

5.2 OPTICAL SPECIFICATIONS

Item		Symbol	Conditions	Specifications Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_X=0°, θ_Y =0° Viewing normal angle	250	300	-	-	(2),(6)
Response Time		t_{ON}		-	15	30	ms	(3)
		t_{OFF}		-	35	50	ms	
Luminance of white (Average Luminance)		L_{AVE}		200	230	-	cd/m^2	(4),(6)
Cross Talk		CT		-	-	5.0	%	(5),(6)
Luminance Uniformity Chromaticity	Red	Rx		0.61	0.63	0.65		(1), (6)
		Ry		0.34	0.36	0.38		
	Green	Gx		0.28	0.30	0.32		
		Gy		0.57	0.59	0.61		
	Blue	Bx		0.13	0.15	0.17		
		By		0.07	0.09	0.11		
	White	Wx		0.30	0.32	0.34		
		Wy		0.31	0.33	0.35		
Viewing Angle	Hor.	θ_X+	CR=5	70	80	-	Deg.	
		θ_X-		70	80	-		
	Ver.	θ_Y+		50	60	-		
		θ_Y-		70	80	-		
White Variation		δW	θ_X=0°, θ_Y =0° Viewing normal angle	-	20	30	%	(6),(8)

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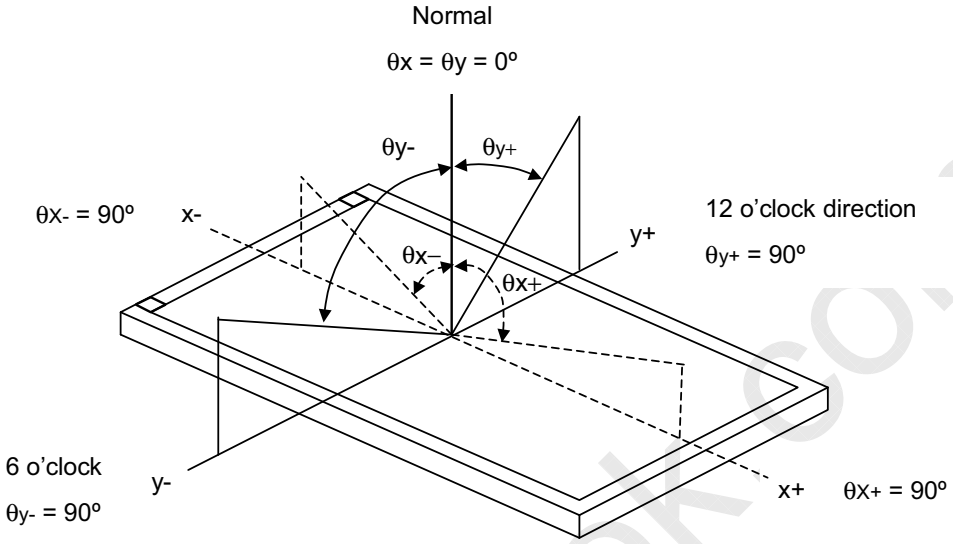
Note (1) Definition of Viewing Angle θx, θy:



Note (2) Definition of Contrast Ratio:

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

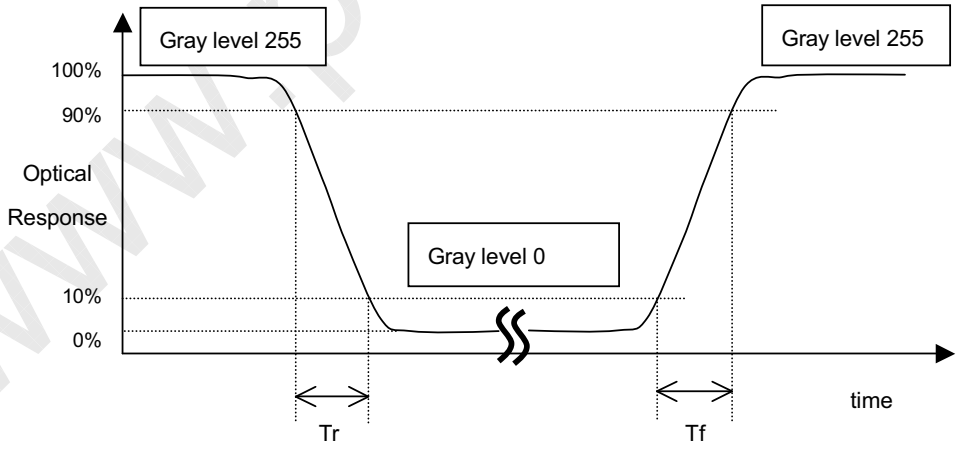
L255: Luminance on the white raster (gray level 255)

L 0: Luminance on the black raster (gray level 0)

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (7).

Note (3) Definition of Response time:



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Note (4) Definition of Average Luminance of White:

Measure the luminance of gray level 255 at 5 points

L_{AVE} = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 5

L (x) is corresponding to the luminance of the point X at Figure in Note (7).

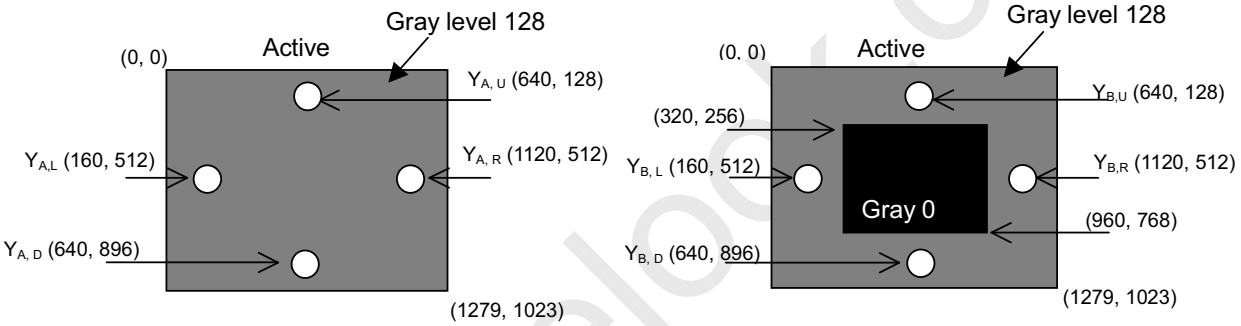
Note (5) Definition of Cross Talk (CT):

CT = | Y_B – Y_A | / Y_A ×100 (%)

Where:

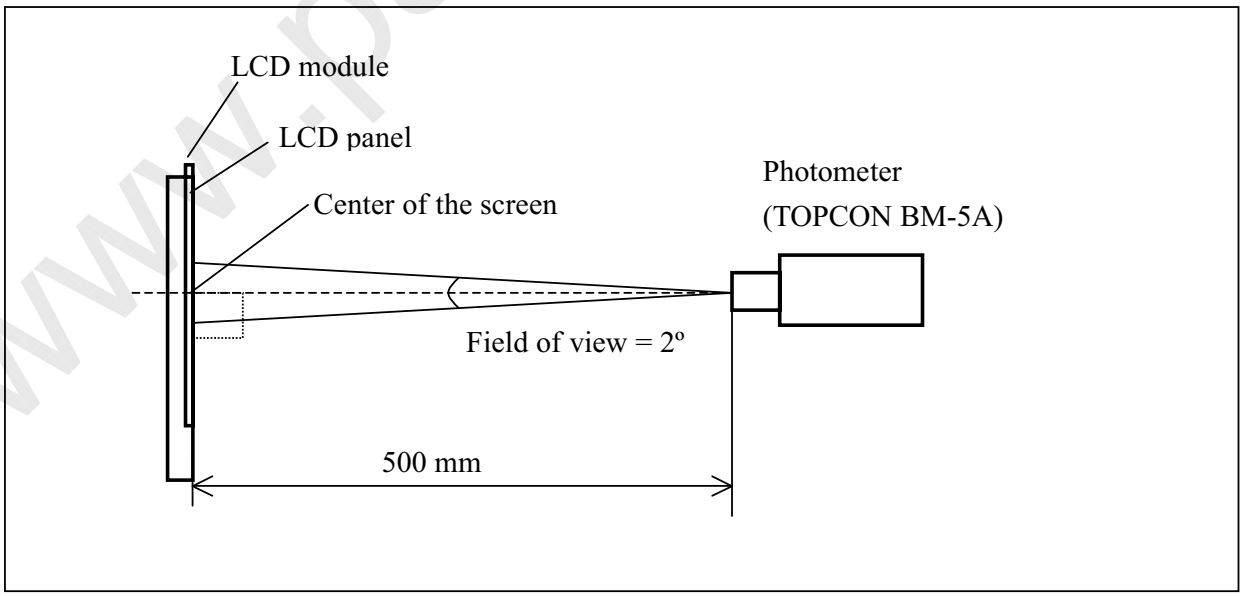
Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)



Note (6) Measuring setup:

The measurement supposes to be executed after stabilizing the panel at given temperature during 20 minutes in the case of abrupt temperature change. The measurement shall be executed after lighting at rating 20 minutes. In order to stabilize the luminance, LCD shall not be gotten winds.



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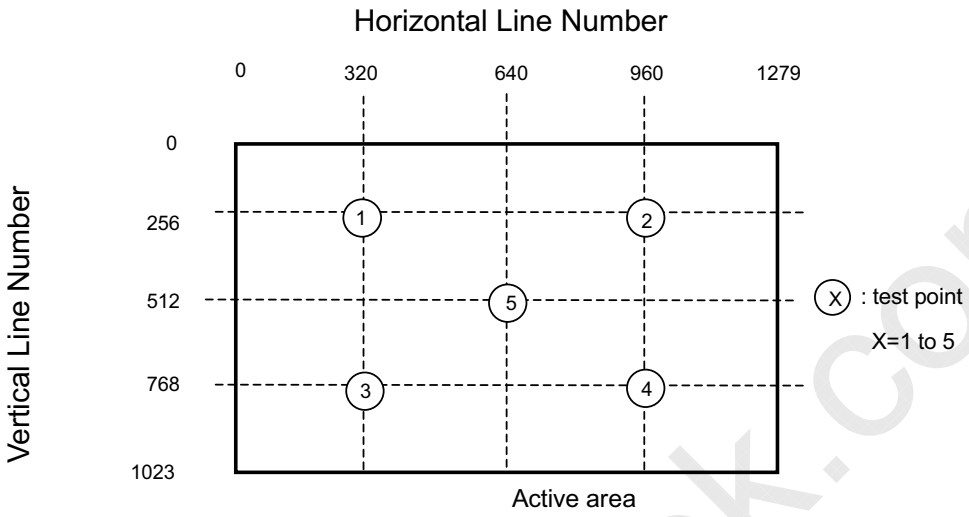
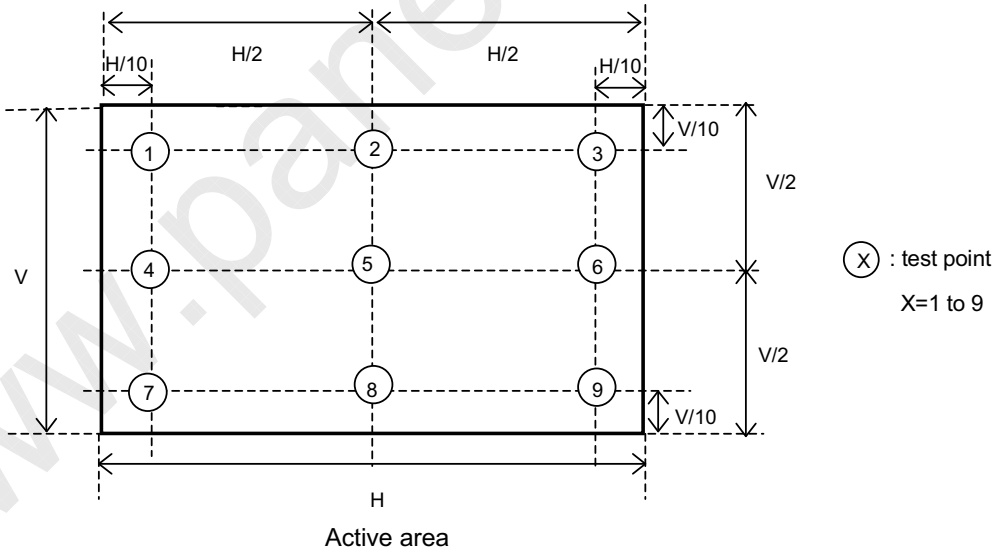
Note (7) Definition of luminance



Note (8) Definition of luminance uniformity δW (9 points, gray level 255):

$\delta W = 100\%[Lmax – Lmin] / Lmax = 100\% [1 – Lmin / Lmax]$



6. MECHNICAL DRAWING

Please refer to the attached drawings.

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7. PRECAUTION

7. 1 ASSEMBLY AND HANDLING PRECAUTION

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) To assembly and install module into user's system are only in clean working areas. The dust and oil may cause an electrical short or worsen the polarizer.

(3) It's not permitted to pressure or impulse the module because the LCD panel and backlight,

(4) Always follow the correct power sequence when user connects and operates the LCD module to prevent damage to the CMOS LSI chips during latchup.

(5) Do not pull the I/F connectors in or out while the module is operation.

(6) Do not disassembly the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(8) Any moisture come into contact with the LCD module is dangerous because LCD modules is turned on with moisture on its surface may cause it damage.

(9) The high temperature or humidity may reduce the performance of module, to store LCD module within the specified storage condition.

(10)The ambient temperature is lower than 10ºC may reduce the display quality, for example, response time become slowly, the starting voltage of CCFL is higher than room temperature.

7.2 SAFETY PRECAUTION

(1) The startup voltage of backlight is approximately 1000 Volts. It may cause electrical shock during assembly with inverter. Do not disassemble the module or insert anything into the backlight unit.

(2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(3) After the module's end of life, it is not harmful in case of normal operation and storage.

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8. PACKAGING

8.1 PACKING SPECIFICATIONS

(1) 5 LCD modules / 1 Box

(2) Box dimensions : 534(L) X 316(W) X 462(H) mm

(3) Weight : approximately 8.0Kg (5 modules per box)

8.2 PACKING Method

Figures 8-1and 8-2 are the packing method.

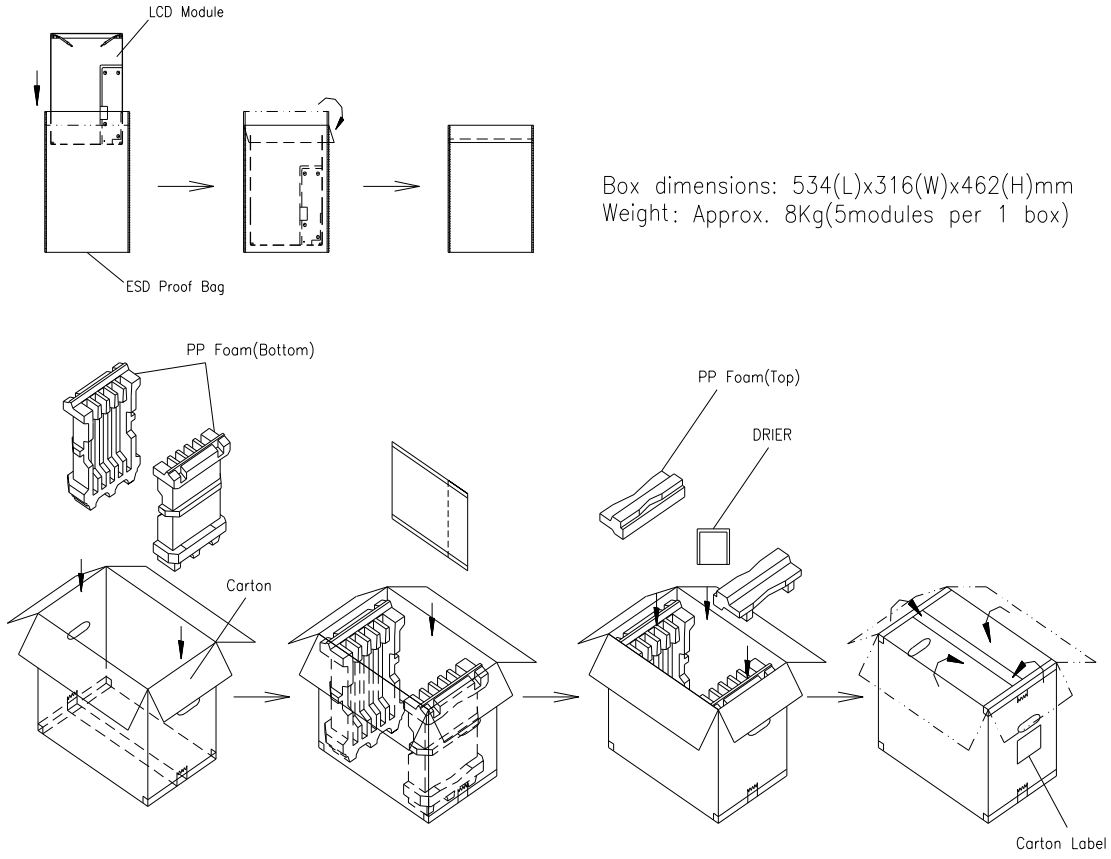

Figure. 8-1 Packing method

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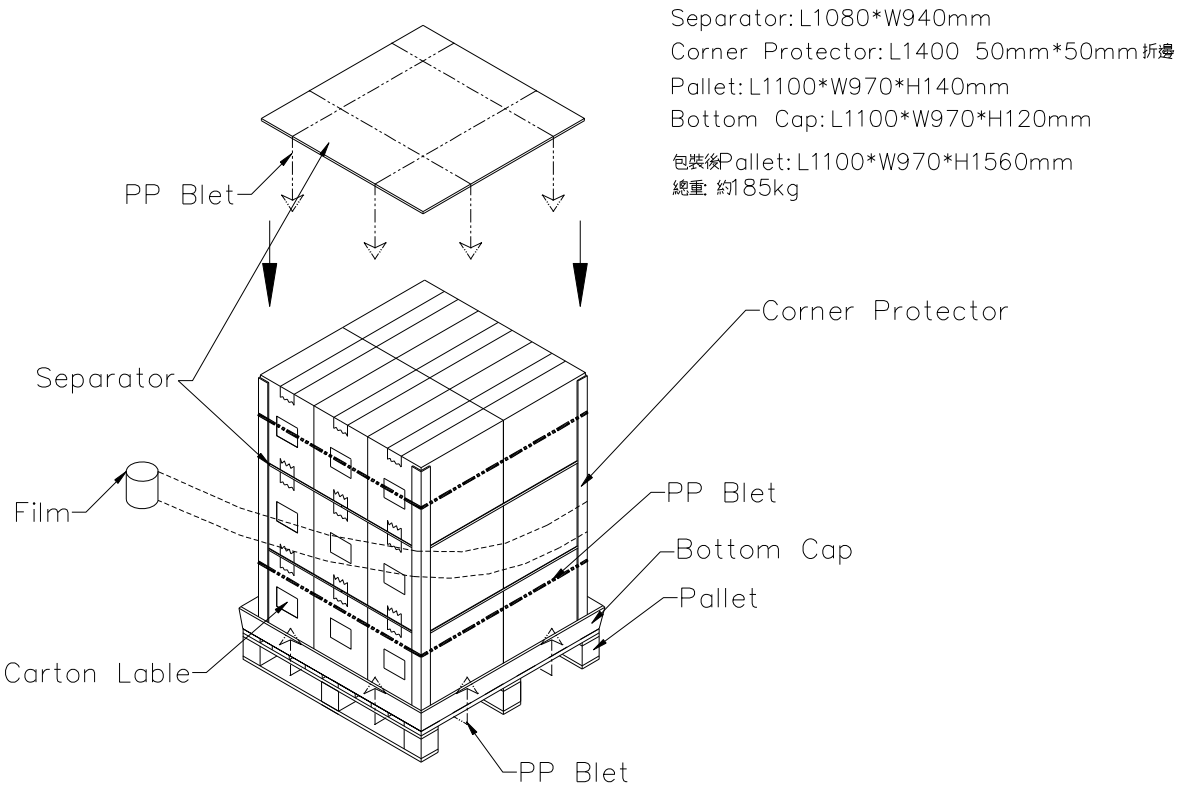

Figure. 8-2 Packing method

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9. INCOMING INSPECTION DAY

The Supplier should be acquainted the inspection results (acceptance or rejection) by Customer, and the results are in accordance with the incoming inspection standard within 30 days after the date of the bills of lading.

Should Customer fail to so notify the Supplier within the said 30 days period. The Customer's right to reject the LCMS shall then lapse, and the said LCMS shall be deemed to have been accepted by the customer.

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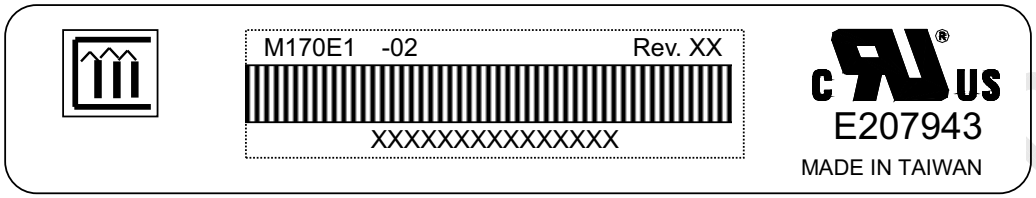
10. Definition of Shipping Label on Module

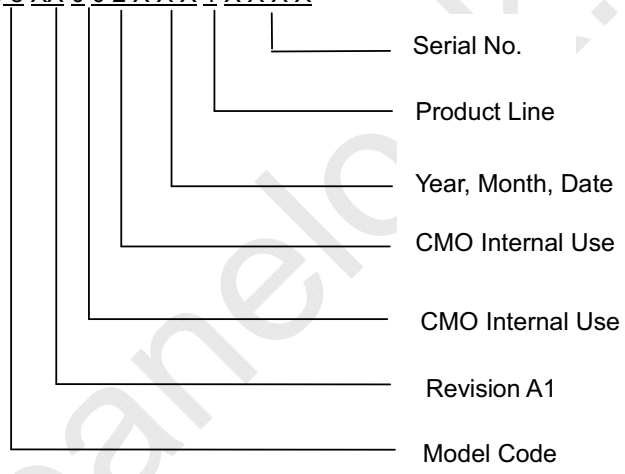
The barcode nameplate is pasted on each module as illustration, and its definition is as following explanation.



(1) Model Name: M170E1 -02

(2) Revision Rev.XX

(3) Serial ID: 0 8 XX 0 0 2 X X X 1 X X X X



Serial ID include the information as list.

1. Manufactured Date:

   Year: 0~9, for 2000~2009

   Month: 0~9, A~C, for Jan. ~ Dec.

   Day: 0~9, A~Y, for 1st to 31st, exclude I and O

2. Revision Code: cover all the change
3. Model code
4. Serial No. : Manufacturing sequence of product
4. Product Line : 1 -> Line1, 2 -> Line 2 …,etc.

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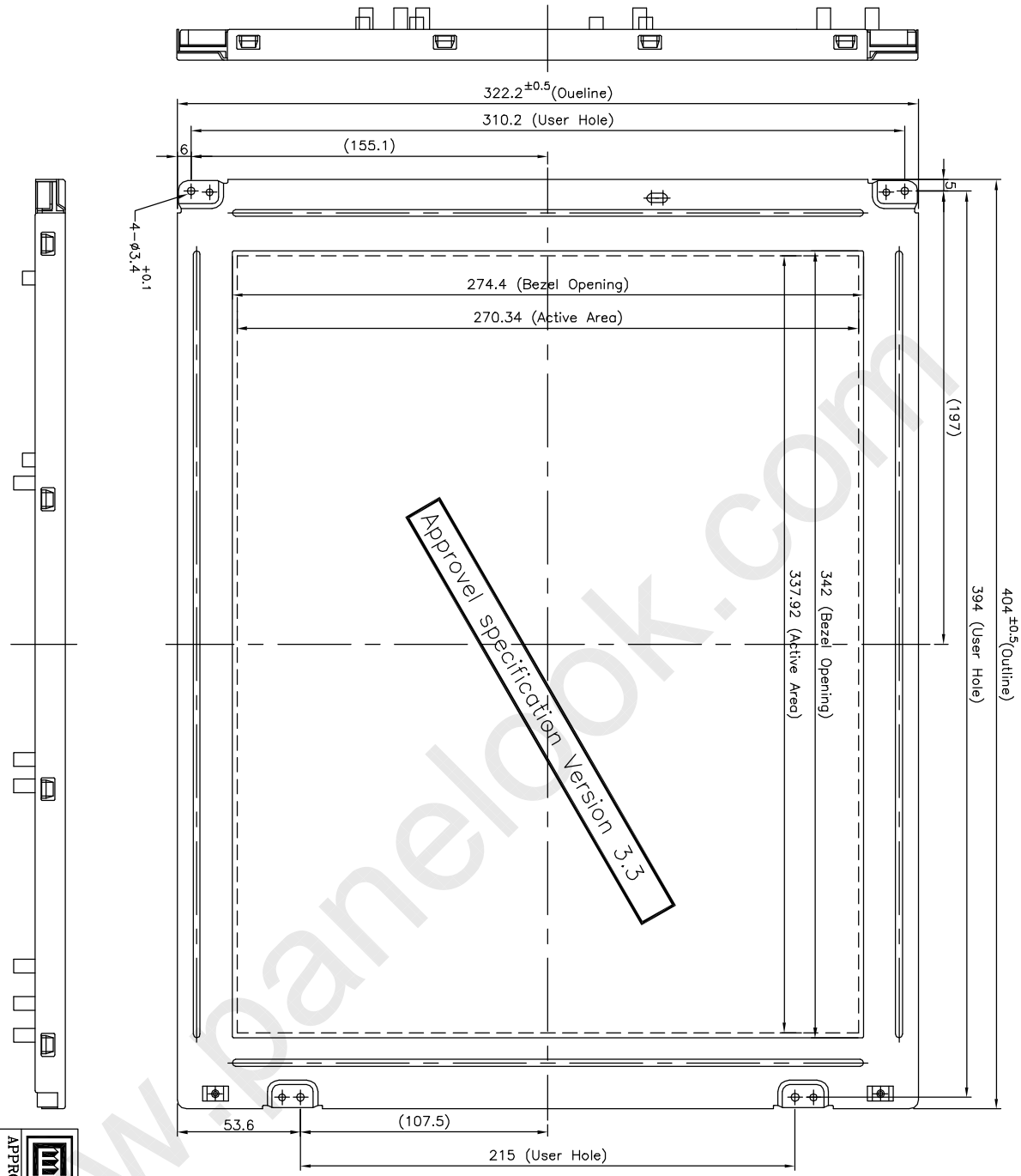

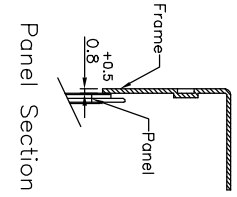

NOTES:
1. GENERAL TOLERANCE:±0.5

APPROVED: JACK FAN	CHI MEI OPTOELECTRONICS CORP.		
CHECKED: DAVID LIN		DWG NO.: M170141O4A	
DESIGNER: DAVIS WANG		DATE: 06/07/2001	
DRAWER: DAVIS WANG		REV.: A	PART NO.: MHOE101902
TITTLE: Outline M170E1-02		UNIT: MM	SCALE: 1:2
			SHEET: 1/2

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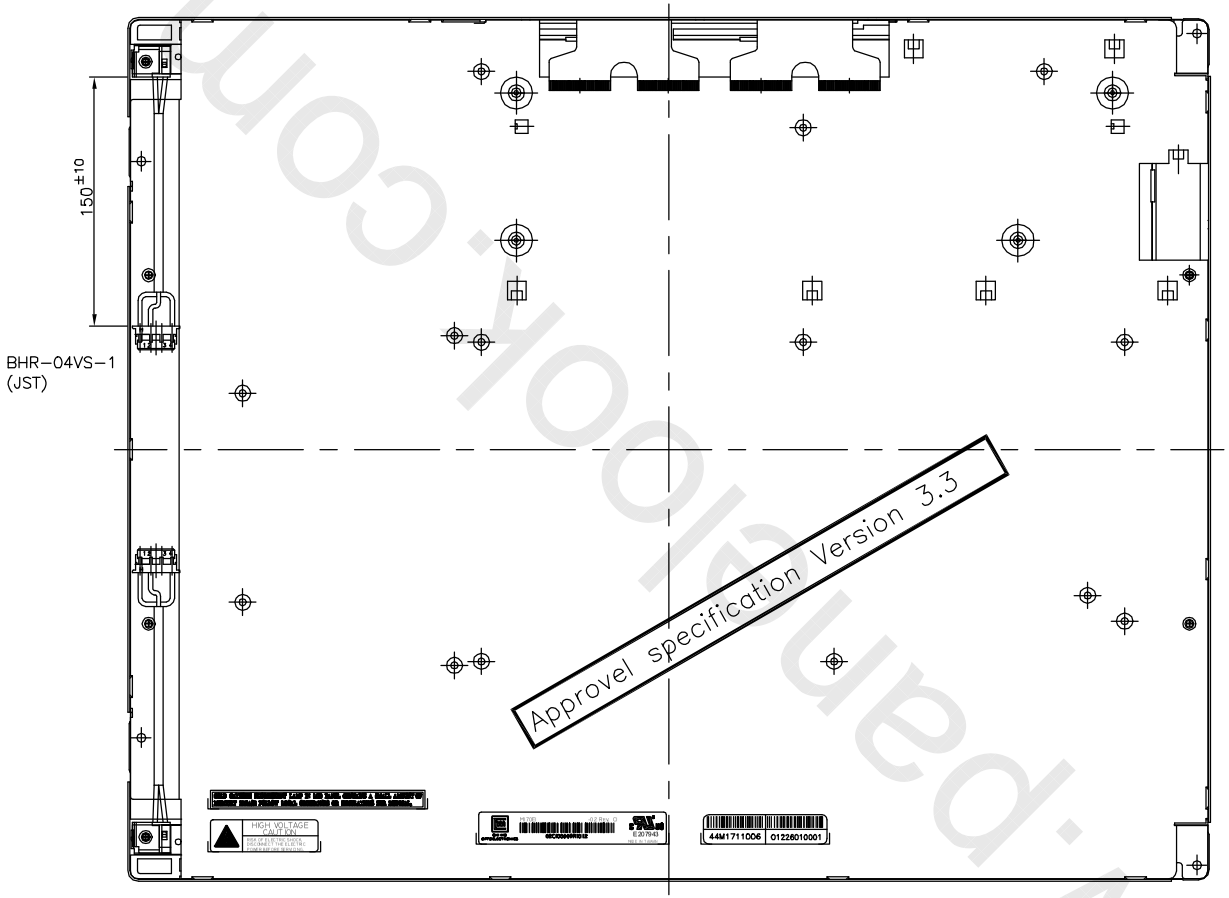

NOTES:
1. GENERAL TOLERANCE:±0.5
2. INSERT BOSS TORQUE 2.5~3.0kgf-cm

CHI MEI OPTOELECTRONICS CORP.					
APPROVED: JACK FAN		DWG NO.: M17014104A			
CHECKED: DAVID LIN		DATE: 05/31/2001			
DESIGNER: DAVIS WANG		PART NO.: MH0E101902			
DRAWER: DAVIS WANG		REV.: A	UNIT:	SCALE:	SHEET:
TITLE: Outline M170E1-02			MM	1:2	2/2

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